



**QUALCOMM Incorporated**

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December 19, 2012

Marlene H. Dortch  
Secretary  
Federal Communications Commission  
445 12<sup>th</sup> Street, SW  
Washington, DC 20554

**Re: Written *Ex Parte* Presentation in RM-11640 –  
Petition for Rulemaking to Establish a Next Generation Air-Ground  
Service On A Secondary Licensed Basis In The 14.0 to 14.5 GHz Band**

Dear Ms. Dortch:

QUALCOMM Incorporated (“Qualcomm”) hereby responds to the December 11, 2012 filing by the Satellite Industry Association (“SIA”) in the above-referenced docket.<sup>1</sup> Qualcomm addresses each of SIA’s concerns in the attachment to this letter.

Qualcomm has closely reviewed the interference concerns raised by SIA and once again shows that there is no risk that the Next Generation Air-Ground Service will cause harmful interference to incumbent GSO FSS uplinks, nor is there any risk that the incumbent users of the 14.0 to 14.5 GHz band will cause harmful interference to the Next-Gen AG service. The Next-Gen AG service has been designed to operate in the presence of all incumbent users of the band and will not suffer harmful interference from, or cause harmful interference to, such users.

Therefore, given the pressing need to support broadband connectivity on-board aircraft,<sup>2</sup> Qualcomm urges the FCC to promptly issue a Notice of Proposed Rulemaking proposing to establish the Next-Gen AG service on a secondary licensed basis in the 14.0-14.5 GHz band so that the proposed service can soon become a reality. Qualcomm will continue working with the FCC and all interested stakeholders in this proceeding.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'D. Brenner', written over a horizontal line.

Dean R. Brenner  
Senior Vice President, Government Affairs

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<sup>1</sup> See SIA December 11, 2012 [filing](#) in RM-11640.

<sup>2</sup> Indeed, FCC Chairman Julius Genachowski recently urged the Acting Administrator of the FAA to “enable greater use of tablets, e-readers, and other portable devices” during flights. See Nick Bilton, “FCC Calls on F.A.A. to Allow Electronics on Planes,” NEW YORK TIMES Blog (Dec. 6, 2012) available at <http://bits.blogs.nytimes.com/2012/12/06/fcc-calls-on-faa-to-allow-electronics-on-planes/>.

Att.: Qualcomm Technical Response to SIA's December 11, 2012 Filing

cc w/ Att.	Jim Ball	Julius Knapp
(via email)	Brian Butler	Geraldine Matisse
	Kathleen Collins	Jamison Prime
	Howard Griboff	Sci-Byung K. Yi
	Ira Keltz	

## **Attachment**

### **QUALCOMM TECHNICAL RESPONSE TO SIA's DECEMBER 11, 2012, FILING**

#### **Response to Section 1**

The calculations in the Petition for Rulemaking are based upon an emission level into the geo-arc of 2.5 dBW/50 MHz, a Next-Gen AG network configuration comprised of 150 Ground Station ("GS") sites, each with a front to back GS antenna gain roll-off of 37 dB, a satellite G/T of 2 dB, and a 0.5% Rise over Thermal ("RoT") level. Qualcomm agrees with SIA that if these parameters are modified to reflect a satellite G/T of 6 dB, 250 GS sites, and an RoT of 0.33%, then the emission level into the geo-arc would need to be lowered from 2.5 dBW/50 MHz to approximately -5.4 dBW/50 MHz. Accordingly, Qualcomm maintains that the emission level into geo-arc should be developed through the rule making process based upon the other interrelated system parameters, *e.g.*, satellite G/T, RoT, etc.

As Qualcomm explained in its March 28, 2012, filing, the emission level of -5.4 dBW/50 MHz into the geo-arc could be implemented as follows: Where the number of GS sites is increased from 150 to 250, the average maximum EIRP from each site would be reduced by approximately 2.2 dB as it is serving a smaller cell. Thus, the EIRP for a 250 GS site network would be 0.3 dBW/50 MHz, assuming a GS front to back antenna gain ratio of 37 dB, a satellite G/T of 2 dB and 0.5% RoT. Where the calculations are carried out with a satellite G/T of 6 dB and RoT of 0.33%, the emissions into the geo-arc would have to be further reduced by 5.8 dB to approximately -5.5 dBW/50 MHz. In order to reduce the emission by 5.8 dB while maintaining the same coverage, the front to back roll-off of the GS antenna needs to be increased from 37 dB to approximately 43 dB. However, as shown in the GS antenna pattern information and the GS antenna prototype measurements in Qualcomm's July 31, 2012 filing (which was reiterated in Qualcomm's October 30, 2012 filing), the GS antenna prototype has a front to back ratio of more than 50 dB, so the additional 5.8 dB of roll-off can be accommodated.

In sum, Qualcomm and SIA appear to agree on the required emission limits when they are based upon the assumptions in SIA's December 11, 2012, filing. And, most importantly, the Next-Gen AG system can meet those emission limits as explained above.

#### **Response to Section 2**

Qualcomm's method of computing overall VSAT interference (while it is independent of the specific terminal type and protocol) is based on the fact that the overwhelming majority of VSAT stations will be inexpensive, low transmit EIRP terminals. Hence, the transponder Saturation Flux Density ("SFD") Qualcomm used in its calculations is typical of the values that the satellite operator can choose to support low-cost, low-EIRP terminals. It is true, as SIA points out, that the operator can choose higher values. But, in general, the operator would not do

that, for the use of higher values would force higher EIRP and, thus, impose cost on VSAT customers and also result in higher interference to adjacent satellites.

It is true that the FCC's VSAT regulations permit higher EIRP values than the 40 dBW level that Qualcomm cites as typical, and there are instances where such higher power terminals are used. The number of such higher-powered terminals in use is a small minority and these terminals generally use a larger antenna (instead of or in addition to a higher-powered power amplifier) to increase their transmit EIRP. By definition, such larger antenna terminals fall out of the VSAT class. Such larger antennas would have less of an interference impact on the Next-Gen AG system because they have smaller sidelobes than the VSAT antenna type that Qualcomm used in its calculations. In other limited cases, such as on an offshore oil rig where there are space limitations, the operator may use a small antenna combined with a large amplifier. Accordingly, to compute the total EIRP projected toward the GSO satellite arc by multiplying the total VSAT population by the maximum permissible EIRP value would generate a completely unrealistic value. As was mentioned in Qualcomm's October 30, 2012 filing, Qualcomm's methodology does not depend on the exact value of EIRP or protocol of the VSATs. The methodology used by Qualcomm only requires that the bulk of the VSAT units address satellite transponders that use lower values of SFD.

For VSAT terminals that use higher transmit EIRP and larger antennas, the operator would most likely use a large portion of the transponder exclusively, such as the TDMA terminals that SIA mentions. In that case, the number of such simultaneously transmitting terminals would be much smaller than the number of VSATs because there are a limited number of satellite slots and there would be one transmitting terminal for each FDMA channel.

Qualcomm also realizes that the interference from fixed terminals near the Next-Gen AG GS is not of short duration; nevertheless, the capacity loss from these terminals is quite small. The cases where there is a 30% loss of capacity, as mentioned in Qualcomm's October 30, 2012, filing, occur only where a very high power mobile transmitter that uses a transponder's entire spectrum is parked very close to the Next-Gen AG GS for some short-term need. Qualcomm referred to these cases as short term because the Next-Gen AG GS would not be deployed near any such fixed FSS transmitter that transmits at high power and uses an entire transponder's bandwidth.

The last paragraph in Section 2.4 of SIA's December 11, 2012, filing implies that the Next-Gen AG system searches for a 2 MHz piece of spectrum in which to operate where there is excessive interference. That is not accurate. Qualcomm's July 31, 2012, and October 30, 2012, filings explained that the proposed Next-Gen AG system uses a multi-carrier version of LTE that hops frequencies across a 100 MHz band. So, at worst, if some part of this 100 MHz band has very high interference, the system continues to operate and the loss of capacity is equal to the fraction of spectrum with high interference during the time such interference is present. If the bandwidth of the potentially interfering transmitter is small, such as the 400 kHz system mentioned in SIA's

filing, the effect on the Next-Gen AG system will be the loss of that portion of the spectrum during the time it transmits. Since the duty cycle of VSAT terminals is typically quite low, the capacity loss of a Next-Gen AG GS with a 100 MHz carrier is a fraction of a percent in the presence of fixed terminals. It is true, as SIA states, that 89% of the on-orbit Ku-band transponder capacity may be in use. However, as Qualcomm has explained, very few Ku-band terminals near a Next-Gen AG GS would have a clear line of sight to the GS antenna and interfere with the GS receiver. The combination of the low density of VSAT terminals in the vicinity of the Next-Gen AG GS, the narrow bandwidth and low duty cycle of many of those VSAT services, and the clutter and obstructions that will be present, will only cause a small fraction of the 100 MHz bandwidth to be lost. In the case of interference to the Next-Gen AG aircraft receiver, the large distance between the aircraft and the VSAT terminal as well as the antenna roll-off of the VSAT terminals and the aircraft terminal will result in a small increase to the Next-Gen AG's aircraft receiver's noise floor as was explained and calculated in the Petition for Rulemaking.